given, and its power as a working instrument is illustrated by examples. By the help of this symbol, certain expressions which occur in endeavouring to extend the theory of symmetric products to quintics are greatly simplified and presented in an intelligible form, and the direct calculation is effected of a certain sextic equation on the solution whereof that of the general quintic may be made to depend.

The third and concluding section is chiefly occupied with the calculation of the perfect symmetric product for the quintic. By combining Eulerian with Lagrangian functions, and introducing a simple artifice, the symmetric product for the quintic wanting in its second term is obtained. This result is then made the basis of a calculation for the perfect form. Employing the property of seminvariancy pointed out by Mr. Cayley, the author succeeds in effecting the calculation of the symmetric product for the complete quintic. This product is composed of *three hundred and twenty-five functions of twenty-four dimensions.*

III. "On the Surface-condensation of Steam." By J. P. Joule, LL.D., F.R.S. Received Oct. 10, 1860.

(Abstract.)

In the author's experiments steam was passed into a tube, to the outside of which a stream of water was applied, by passing it along the concentric space between the steam-tube and a wider tube in which the steam-tube was placed. The steam-tube was connected at its lower end with a receiver to hold the condensed water. A mercury gauge indicated the pressure within the apparatus. The principal object of the author was to ascertain the conductivity of the tube under varied circumstances, by applying the formula suggested by Professor Thomson,

$$C=\frac{w}{a}\log\frac{V}{v},$$

where a is the area of the tube in square feet, w the quantity of water in pounds transmitted per hour, V and v the differences of temperature between the inside of the steam-tube, and the refrigerating water at its entrance and at its exit. The following are some of the author's most important conclusions.

1. The pressure in the vacuous space is sensibly the same in all parts.

2. It is a matter of indifference in which direction the refrigerating water flows in reference to the direction of the steam and condensed water.

3. The temperature of the vacuous space is sensibly equal in all its parts.

4. The resistance to conductivity must be attributed almost entirely to the film of water in immediate contact with the inside and outside surfaces of the tube, and is little influenced by the kind of metal of which the tube is composed, or by its thickness up to the limits of that of ordinary tubes.

5. The conductivity increases up to a limit as the rapidity of the stream of water is augmented.

6. By the use of a spiral of wire to give a rotary motion of the water in the concentric space, the conductivity is increased for the same head of water.

The author, in conclusion, gives an account of experiments with atmospheric air as the refrigerating agent; the conductivity is very small in this case, and will probably prevent air being employed for the condensation of steam except in very peculiar circumstances.

IV. "Notice of Recent Scientific Researches carried on abroad." By the Foreign Secretary.

During the last Session of the Royal Society the Council passed a Resolution,—That it should be one of the duties of the Foreign Secretary to furnish the Society, from time to time, with early notice of researches of special importance carried on abroad; such notice to be drawn up in the form of a short communication to the Society, to be read as early as practicable at an Evening Meeting of the Society, and published in the 'Proceedings.' In the time which has since elapsed I have been only partially successful in obtaining that cooperation without which it is scarcely possible to comply with the instructions of the Council.